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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

94-RPS-125 FEB 17 1994

Mr. J. McCormick, Director
Air and Toxics Division
U.S. Environmental Protection Agency
Region 10
Mail Stop AT-082
1200 Sixth Avenue
Seattle, Washington 98101

9417322.1400

Dear Mr. McCormick:

APPLICATION FOR APPROVAL FOR CONSTRUCTION PURSUANT TO 40 CODE OF FEDERAL REGULATIONS 61 PROJECT W-320, TANK 241-C-106 SLUICING

Enclosed please find an application for approval to construct Project W-320, Tank 241-C-106 Sluicing. Approximately 6,000 gallons of water are added each month to Tank 241-C-106 for evaporative cooling of the tank waste. Sluicing the waste to Tank 241-AY-102 will allow the water additions to cease and will allow Tank 241-C-106 to be placed in a safe, interim stabilized condition. Tanks 241-C-106 and 241-AY-102 are both located in the 200 East Area of the Hanford Site.

Because the heat generated in Tank 241-C-106 is a safety issue, the schedule for the project has been accelerated and your prompt attention to this application would be appreciated. This acceleration will allow the addition of water to a single shell tank (241-C-106) to cease at an earlier time.

Should you have any questions, please contact me or Mr. S. D. Stites of my staff on (509) 376-8566.

Sincerely,

James D. Bauer

James D. Bauer, Program Manager
Office of Environmental Assurance,
Permits, and Policy

EAP:SDS

Enclosure

cc w/encl:
J. P. Harris III, WHC
[redacted]

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NATIONAL EMISSION STANDARD FOR HAZARDOUS AIR POLLUTANTS APPLICATION FOR APPROVAL TO CONSTRUCT PROJECT W-320, TANK 241-C-106 SLUICING

1.0 PROPOSED NATURE OF THE SOURCE

Tank 241-C-106 (106-C) is a 530,000-gallon-capacity single shell tank (SST) located in the C-Tank Farm in the 200 East Area of the Hanford Site. The tank has been used for radioactive waste storage since 1947.

Between mid-1963 and mid-1969, Tank 106-C received approximately 132,000 gallons of high-heat waste, including neutralized Plutonium-Uranium Extraction high-level waste and strontium-bearing solids from the strontium and cesium recovery program. In 1971, temperatures in excess of 99°C (210°F) were observed in the tank. The current decay heat generation rate has been calculated at (110,000 Btu/hr ± 20,000 Btu/hr). Tank 106-C was withdrawn from active service in 1979 and is categorized as sound (i.e., not known to be leaking).

Approximately 6,000 gallons of water are added to this tank every month to facilitate evaporative cooling of the strontium-loaded waste. If these cooling water additions are stopped, the sludge temperatures will exceed established limits and may cause structural damage to the tank. Should the tank start to leak, the continuation of water additions required to cool the waste would increase the amount of leakage to the soil column.

Project W-320, Tank 241-C-106 Sluicing is intended to mobilize and remove the heat-generating sludge in Tank 106-C to resolve the high-heat safety issue. Tank-to-tank sluicing, an existing proven technology, will provide the earliest possible closure of this safety issue. Removal of heat-generating sludge will allow the tank to be placed in a safe, interim stabilized condition.

Tank 106-C waste retrieval sluicing system (WRSS) will be designed to remove the sludge from Tank 106-C and transport the material to the 241-AY-102 (102-AY) double shell tank (DST) via a new, temporary, below grade, bermed encased transfer line. The scope of Tank 106-C WRSS includes the following functions:

- Mobilization and retrieving waste in Tank 106-C;
- Conveying waste out of Tank 106-C;
- Transferring waste to Tank 102-AY at a controllable rate;
- Confining and filtering airborne hazardous and radionuclide particulate and vapors from Tank 106-C by use of a new ventilation system;
- Removing heat as required to maintain safe temperature levels in the tank;
- Monitoring and control operations;
- Shielding operations and maintenance actions.

2.0 PROPOSED SIZE OF THE SOURCE

A maximum of 360 standard cubic feet per minute (scfm) will be exhausted through the new ventilation system installed on Tank 106-C as a part of Project W-320.

3.0 PROPOSED DESIGN OF THE SOURCE

When operations begin, the liquid level in Tank 102-AY will contain enough space to transfer most of the solids in Tank 106-C, plus the anticipated liquid additions (e.g., line flushes). If the anticipated liquid volume precludes this, sluicing operations will be stopped to let the solids settle in Tank 102-AY and transfer the supernate from Tank 102-AY to the 242-A Evaporator Bottoms System.

During the initial hot operations of the WRSS, Tank 106-C slurry pump will be valved to recirculate solution to one of two sluicers in Tank 106-C. At this point, the sluice pump in Tank 102-AY will not be started. This mode of operation will be maintained until the instruments verify that the slurry can be pumped. A dilution capability will be incorporated in the slurry pump or associated piping to achieve the desired slurry concentration. This step is included to ensure that an initial very high solids content slurry does not plug the transfer line to Tank 102-AY. This mode of operation will be used during subsequent restarts of the WRSS until loading start-up solids is understood and the practice is not needed.

After the solids content is established and verified, the WRSS will be re-valved to send slurry from Tank 106-C's variable speed slurry pump to Tank 102-AY. Tank 102-AY's fixed-speed sluice pump will be simultaneously started to provide fluid to the Tank 106-C sluicers. The main purpose of having a variable speed slurry pump in Tank 106-C is to help maintain a minimum liquid heel in the tank.

An in-tank imaging system that provides near real-time pictures or waste-surface-contour depictions during sluicing operations will be used to help control and direct the sluicing operations. Currently, video, radar and laser systems are under consideration to provide this in-tank imaging capability.

The planned sluicing technique will remove the sludge from Tank 106-C and minimize the potential for leakage. As currently planned, the waste solids against the tank walls will not be sluiced until the end of the sluicing operations. This will minimize the potential for the sluicing stream to cause a leak by impinging on a weak point in the tank wall or by opening a potentially pre-existing corrosion or sludge-plugged leak site. Because the slurry pump will be located in a riser near the tank wall, it is anticipated that the adjacent tank wall will be exposed, because of the slurry flowing into the pump intake.

After the slurry pump is back-flushed down into the solids as far as possible, the pump will start recirculating (as previously described) to prevent potential line plugging problems. After the minimum liquid volume required to maintain effective slurry pump operations is determined by using the in-tank imaging system and evaluating the pump's characteristics, sluicing operations will start. Currently, the sluicer's direction will be controlled from the sluicing control room by the in-tank imaging system and a simple controller, which is programmed to aim the sluicer away from the tank walls. Initial sluicing would be completed with the sluicer located next to the slurry pump. This initial sluicing is to create channels in the waste to direct the flow of waste slurry to the intake of the slurry pump. After these channels are established, sluicing will be switched to the sluicer on the opposite side of the tank. This sluicer will be most effective at moving waste to the slurry pump.

Routine sluicing operations will use either of the sluicers individually. Sluicing will be switched between the two sluicers to maintain the slurry flow channels and to achieve the highest possible solids recovery rate. This approach minimizes the length of the sluicing operations, the potential for a tank leak, and the leak volume, if a leak should occur during sluicing operations.

The sluicing operation mode of the exhauster has been designed to handle a particle loading of 100 milligrams per cubic meter and to remove the heat generated by the sluicing equipment in a safe manner. Approximately 1040 to 1220 scfm will be withdrawn from the tank headspace. This will flow through a recirculating condenser and a mist eliminator. Approximately 860 scfm will then be returned to the tank headspace. The remaining flow (up to 360 scfm) will flow through a high efficiency mist eliminator, a heater and high efficiency metal filter, and two high efficiency particulate air filters prior to discharge to the atmosphere. The sampling system on the exhaust stream is being designed to the requirements of 40 Code of Federal Regulations (CFR) Part 61 and referenced requirements.

4.0 OPERATING DESIGN CAPACITY

The storage capacity of the tank will not be altered due to this project. Tank 106-C has a nominal capacity of 500,000 gallons and Tank 102-AY has a nominal capacity of 1,000,000 gallons.

5.0 METHOD OF OPERATION

The ventilation system will be operated 24 hours a day, until sluicing operations are complete. At that time, a decision will be made on the need to actively ventilate Tank 106-C. It is possible that ventilation will not be required, and a breather filter will be installed on Tank 106-C, similar to other SSTs.

The stack will be equipped with sampling equipment designed and operated in accordance with 40 CFR 61, Subpart H, and all referenced requirements. Among other design criteria, sample probes will be designed to obtain representative samples, the location will be selected in accordance with referenced standards, and sample line length and bends will be minimized. The sampler will operate continuously and will be calibrated and audited in accordance with procedures currently used in tank farms. Additionally, for operational purposes, the stack will contain a monitor for beta and gamma radiation.

6.0 EMISSIONS CONTROL SYSTEM

The emission control system, as described in Section 3.0, consists of a high efficiency mist eliminator, heater, high efficiency metal filter and two high efficiency particulate air filters.

6.1 EMISSIONS RELEASE RATES

A source term was developed based on existing knowledge of the tank contents. Further calculations were performed to account for the emissions expected from the sluicing equipment. Based on this information, uncontrolled emissions have been estimated and are included in Table 1. This information is taken from "Project W-320 Revised Headspace Characterization," 7E110-93-124.

The high efficiency mist eliminator has an efficiency of 93 percent and the high efficiency particulate air filter has an efficiency of 99.95 percent for particulates. This results in an overall efficiency of 99.998 percent. Credit is taken for only one high efficiency particulate air filter, for conservatism.

6.2 OFFSITE DOSES

Table 1 also contains the dose to the maximally exposed offsite individual from the release. The unit dose factors were previously developed and provided to the regulatory agency (WHC 1991).

Table 1: Emissions and Offsite Dose

Radionuclide	Expected Annual Emissions (Ci/yr)	Unit Dose Factor (mrem/Ci)[1]	Control System DF	Controlled dose to the MEI (mrem/yr)
Am-241	5.52 E-02	1.31 E+01	4.76 E+04	1.52 E-05
C-14	4.06 E-06	2.62 E-03	1	1.06 E-08
Ba-137m	1.90 E+01	2.39 E-02	4.76 E+04	9.55 E-06
Ce-144	1.44 E+00	1.37 E-02	4.76 E+04	4.13 E-07
Co-60	3.09 E-02	2.90 E-02	4.76 E+04	1.88 E-08
Cs-137	2.01 E+01	2.39 E-02	4.76 E+04	1.01 E-05
Eu-154	3.39 E-01	3.64 E-01	4.76 E+04	2.59 E-06
I-129	7.85 E-05	2.91 E-01	1	2.28 E-05
Pu-239	6.00 E-02	8.67 E+00	4.76 E+04	1.09 E-05
Sb-125	1.00 E+00	4.15 E-03	4.76 E+04	8.73 E-08
Sr-90	6.44 E+01	4.38 E-02	4.76 E+04	5.92 E-05
Tc-99	7.11 E-03	1.09 E-03	4.76 E+04	1.63 E-10
Y-90	6.40 E+01	3.77 E-04	4.76 E+04	5.07 E-07
Total Dose				1.31 E-04

Note 1: Unit dose conversions are for releases from 200 East Area, except Eu-154. Dose conversion for Eu-154 is not provided in WHC 1991 for releases from the 200 East Area. Consequently, the dose conversion for a release from the 300 Area is used.

The emissions resulting from the sluicing operation are well below the ten mrem/year Standard. The dose resulting from all Hanford Site operations in 1992 was calculated at 0.004 mrem/yr (PNL 1993). The emissions from the sluicing operations, in conjunction with previous operations at the Hanford Site, will not result in a violation of the National Emission Standard for Hazardous Air Pollutants of ten mrem/yr (40 CFR 61).

7.0 REFERENCES

PNL 1993, *Hanford Site Environmental Report for Calendar Year 1992*, PNL 8682, Pacific Northwest Laboratory, Richland, Washington.

WHC, 1991, *Unit Dose Calculation Methods and Summary of Facility Effluent Monitoring Plan Determinations*, WHC-EP-0498, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993, *Project W-320 Revised Headspace Characterization*, 7E110-93-124, Westinghouse Hanford Company, Richland, Washington.

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants (NESHAP)" *Code of Federal Regulations*, as amended.

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